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(54) **Slide fastener closing apparatus.**

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**EP-A- 0 109 643**  
**EP-A- 0 193 954**  
**EP-A- 0 242 213**  
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## Description

This invention relates to an apparatus for closing slide fasteners on a slide fastener chain and more particularly to such as an apparatus which is designed to arrest sliders one at a time and release the slider upon arrival at a predetermined point on the fastener chain.

There are known numerous devices associated with a slide fastener assembling apparatus for holding a slider in place during movement of a fastener chain to couple opposed rows of fastener elements together prior to severing the chain to individual fastener lengths. One such device is disclosed in Japanese Laid-Open Patent Publication 59-103608 EP-A1-0109643 in which there are provided two pairs of transfer rolls, one pair of which designated at A in Figure 8 of the accompanying drawings is provided with tiltable plate members C for releasably holding sliders one at a time mounted on a slide fastener chain F, while the other pair of transfer rolls B is adapted to move the chain until the slider held by the plate members C is brought into abutting engagement with the end stop member on the fastener chain F. The transfer rolls B are driven with a force greater than the tension of springs D associated with the plate members C, so that the plate members C are urged to rotate in the direction of transfer of the chain F thereby permitting the threading of the slider through the plate members C during the forward movement of the chain F.

The above prior art apparatus has a drawback in that as it involves two separate pairs of transfer rolls, the apparatus comes so much complicated and further in that the slider is brought all way back to the terminal end of the coupling element rows and hence cannot be adjusted in position or posture at a desired intermediate point in advance of the end stop portion of the chain.

It is also known from EP 0 242 213 (Art.54(3)) a slide fastener closing device. However this device is designed to close individual slide fasteners which are received therein with their partially open upper end ahead and is designed in such a manner that it would not be able to assert the slider at a position upstream of the nip of its drive rollers.

The present invention seeks to provide a slide fastener closing apparatus which is simple in construction and reliable in operation and which is designed to arrest sliders one at a time and release the slider upon arrival at a predetermined point on a slide fastener chain.

According to the invention, there is provided a slide fastener closing apparatus which comprises: a pressure roller having a peripheral groove and vertically movable toward and away from the path of travel of a slide fastener chain carrying sliders

thereon; a drive roller having a peripheral groove and engageable with said pressure roller across the fastener chain; and a slider arresting means comprising a) an upper stopper received in the peripheral groove in said pressure roller and vertically movable therewith and b) a lower stopper received in the peripheral groove in said drive roller and pivotally connected to a bracket member to move into and out of the path of the fastener chain; said upper and lower stopper cooperating in arresting sliders one at a time at a position in advance of the nip of said pressure and drive rollers.

The above and other objects and features of the invention will be better understood from the following description taken in conjunction with the accompanying drawings in which like reference numerals refer to like or corresponding parts throughout the several views.

Figure 1 is a perspective view of an essential part of the apparatus of the invention;

Figure 2 is a side elevational view of the same;

Figure 3 is a front elevational view of the same;

Figure 4 is a side elevational view, partly schematic, of a general apparatus layout associated with the apparatus of the invention, utilized to explain the flow of an assembled slide fastener chain;

Figure 5 is a bottom view of a portion of a slide fastener chain, indicating the position for arresting the slider;

Figure 6 is a schematic side elevational view illustrating the manner in which the slider is arrested and released;

Figure 7 is a plan view of a portion of an elongate slide fastener chain; and

Figure 8 is a side elevational view of a prior art apparatus.

Referring now to the accompanying drawings and Figure 1 in particular, there is shown a slide fastener closing apparatus 10 which essentially comprises a pressure roller 11 and a drive roller 12 which are brought into peripheral engagement with each other by means hereafter described to feed or transfer a slide fastener chain F, and a slider arresting means 13 comprising an upper stopper 14 and a lower stopper 15 associated with the pressure roller 11 and the drive roller 12, respectively.

As shown in Figure 2, the pressure roller 11 is rotatably journaled in and connected to a roller holder 16 movably supported on a frame 17. The roller holder 16 is moved downwardly together with the pressure roller 11 by a sliding rod 18 connected to a jig cylinder 19 and moved upwardly back to its original position by the action of a tension spring 20. The pressure roller 11 is thus movable toward and away from the path of travel of the fastener chain F and engageable thereacross

with the drive roller 12.

As shown in Figure 3, the drive roller 12 is axially connected to and driven by a horizontally extending drive shaft 21 connected to a drive source not shown.

The upper stopper 14 of the slider arresting means 13 is generally L-shaped and has a vertical arm 14a engageable with an air cylinder 22 (Figure 2) and a horizontal arm 14b received in a peripheral groove 23 in the pressure roller 11 as shown in Figure 1. The upper stopper 14 is connected to the roller holder 16 and vertically movable together with the pressure roller 11.

However, when the jig cylinder 19 is operated to allow the pressure roller 11 to move upwardly apart from the drive roller 12 under the force of the tension spring 20 to release the slide fastener chain F for cutting individual product lengths therefrom, the air cylinder 22 is operated to extend its piston rod to limit the upward movement of the pressure roller 11 and the upper stopper 14 to such an extent that the upper stopper 14 is arranged to retain its operative position in which the slider S is held by and between the upper and lower stoppers 14, 15.

The lower stopper 15 of the slider arresting means 13 has its major portion received in a peripheral groove 24 in the drive roller 12 and includes a relatively short horizontal arm 15a and a relatively long vertical arm 15b. The lower stopper 15 is pivotally connected at the junction of the two arms 15a, 15b to a pin 25 secured to a bracket member 26 to move into and out of the path of the chain F. The horizontal arm 15a has a rise portion 15c which is bifurcated as shown in Figure 1 to provide a pair of confronting lugs 15d for gripping therebetween a slider body S as better shown in Figure 5. The vertical arm 15b is connected at its lower end to and actuated by a jig cylinder 27 to rotate the lower stopper 15 counter-clockwise so as to disengage the lugs 15d from the slider S and is also connected to a tension spring 28 which normally biases the lower stopper 15 clockwise. Designated at 29 is a limiter which is adapted to retain the lugs 15d in selected operative position and which is threaded to be able to adjust its operative length relative to the lower stopper 15.

In operation of the apparatus 10 of the foregoing construction, the upper and lower stoppers 14, 15 of the slider arresting means 13 are held initially in their respective positions indicated by solid line (Figure 6) until the slider S on an individual fastener length of a continuous elongate fastener chain F arrives at and is arrested by the slider arresting means. The slide fastener chain F is assembled with component parts including for example a reinforcing strip, a pin-and-box separator, a top end stop and a slider all on each of

individual fastener product lengths as shown in Figure 7. The fastener chain F is fed or transferred through a position control unit 30 and passed between and gripped by the pressure roller 11 and the drive roller 12 as illustrated in the general equipment layout of Figure 4. The feeding or forward movement of the fastener chain F continues until the slider S reaches the slider arresting means 13 when the parallel side flange portions of the slider S engage in between the confronting lugs 15d of the lower stopper 15 as better shown in Figure 5. While the slider S is thus arrested, the fastener chain F still continues to move between the rollers 11 and 12 so that the rows of fastener elements E become coupled together upon passage through the slider S which has been held stationary. As the fastener chain F arrives at a predetermined point on the path of its travel, the control unit 30 sends a signal to discontinue the travel of the chain F, when the pressure roller 11 ascends and releases the chain F from the drive roller 12.

In this instance, however, the upward movement of the pressure roller 11 and the upper stopper 14 is limited by the air cylinder 22 in such a manner that the upper stopper 14 remains in engagement with the slider S as previously described.

The chain F is then severed by coacting cutters 31, 32 located upstream of the slider handling apparatus 10, whereupon the pressure roller 11 descends and grips the chain F against the driven roller 12 to further move the chain F, in which instance the lower stopper 15 is rotated counter-clockwise by actuation of the cylinder 27 so that the lugs 15d are retracted apart from the slider S as shown by phantom lines in Figure 6. In this manner, the individual slide fastener which has been severed from the chain F is moved out of the apparatus 10 for inventory.

Since the slider S is arrested according to the invention at a position upstream or in advance of the nip N of the two rollers 11, 12; namely, in such a position where the chain F is freely movable, it is possible to arrest the slider S properly even when it is somewhat malaligned on the chain F.

The timing for actuation of the cylinder 27 can be adjusted so as to change the position of the slider S to be released from the arresting means 13 as desired.

## Claims

1. A slide fastener closing apparatus (10) which comprises: a pressure roller (11) having a peripheral groove (23) and vertically movable toward and away from the path of travel of a slide fastener chain (F) carrying sliders (S)

thereon; a drive roller (12) having a peripheral groove (24) and engageable with said pressure roller (11) across the fastener chain (F); and a slider arresting means (13) comprising a) an upper stopper (14) received in the peripheral groove (23) in said pressure roller (11) and vertically movable with said pressure roller (11) and b) a lower stopper (15) received in the peripheral groove (24) in said drive roller (12) and pivotally connected to a bracket member (26) to move into and out of the path of the fastener chain (F); said upper and lower stoppers (14), (15) cooperating in arresting sliders (S) one at a time at a position in advance of the nip (N) of said pressure and drive rollers (11), (12).

2. A slide fastener closing apparatus according to claim 1, further comprising a means (22) for limiting upward movement of said upper roller (11) and said upper stopper (14) such that said upper stopper (14) is retained in operative position when said pressure roller (11) is lifted.
3. A slide fastener closing apparatus according to claim 1 or 2 wherein said lower stopper (15) has a horizontal arm (15a), and a vertical arm (15b), and a rise portion (15c) which is bifurcated to provide a pair of confronting lugs (15d) for gripping therebetween a slider (S).

#### Revendications

1. Appareil (10) pour manoeuvrer des curseurs, comprenant : un rouleau presseur (11) comportant une rainure périphérique (23) et pouvant être rapproché et éloigné verticalement du trajet d'une chaîne (F) de fermeture à glissière portant des curseurs (S); un rouleau d'entraînement (12) comportant une rainure périphérique (24) et pouvant venir en contact avec le rouleau presseur (11) en travers de la chaîne (F) de fermeture à glissière; et un moyen (13) d'arrêt de curseur comprenant (a) une butée supérieure (14) reçue dans la gorge périphérique (23) du rouleau presseur (11) et pouvant être déplacée verticalement avec le rouleau presseur (11) et (b) une butée inférieure (15) reçue dans la gorge périphérique (24) du rouleau d'entraînement (12) et reliée de façon pivotante à un élément de support (26) de manière à pénétrer dans le trajet de la chaîne (F) de fermeture à glissière et à en sortir; les butées supérieure et inférieure (14), (15) coopérant pour arrêter les curseurs (S) un par un à un endroit situé en avant de la ligne de contact (N) des rouleaux presseur et d'entraînement (11), (12).

2. Appareil pour manoeuvrer des curseurs selon la revendication 1, comprenant en outre un moyen (22) pour limiter le déplacement ascendant du rouleau supérieur (11) et de la butée supérieure (14) de telle sorte que la butée supérieure (14) soit maintenue en position active lorsque le rouleau presseur (11) est soulevé.
3. Appareil pour manoeuvrer les curseurs selon la revendication 1, dans lequel la butée inférieure (15) comporte un bras horizontal (15a) et un bras vertical (15b) et une partie surélevée (15c) qui est fourchue afin de constituer une paire de saillies ou pattes (15d) en regard l'une de l'autre et destinées à agripper entre elles un curseur (S).

#### Patentansprüche

1. Vorrichtung (10) zum Schließen von Reißverschlüssen, umfassend: eine Andrückrolle (11), die eine Umfangsnut (23) aufweist und in vertikaler Richtung zu der Bewegungsbahn einer Reißverschlußschieber (S) tragenden Reißverschlußkette (F) hin und von dieser weg bewegbar ist; eine Antriebsrolle (12), die eine Umfangsnut (24) aufweist und über die Reißverschlußkette (F) hinweg mit der Andrückrolle (11) in Eingriff bringbar ist; und eine Schieberhalteeinrichtung (13), umfassend a) einen oberen Anschlag (14), der in die Umfangsnut (23) der Andrückrolle (11) eingreift und mit der Andrückrolle (11) vertikal bewegbar ist, und b) einen unteren Anschlag (15), der in die Umfangsnut (24) der Antriebsrolle (12) eingreift und der mit einem Bügelteil (26) schwenkbar verbunden ist, um ihn in die Bewegungsbahn der Reißverschlußkette (F) hinein und aus dieser heraus zu bewegen; wobei der obere und der untere Anschlag (14, 15) zusammenwirken, um jeweils einen Schieber (S) an einer Stelle vor dem Spalt (N) zwischen der Andrückrolle und der Antriebsrolle (11, 12) festzuhalten.
2. Vorrichtung nach Anspruch 1, ferner umfassend eine Einrichtung (22) zur Begrenzung der Aufwärtsbewegung der oberen Rolle (11) und des oberen Anschlags (14), so daß der obere Anschlag (14) in seiner wirksamen Stellung gehalten ist, wenn die Andrückrolle (11) angehoben wird.
3. Vorrichtung nach Anspruch 1 oder 2, wobei der untere Anschlag (15) einen horizontalen Arm (15a), einen vertikalen Arm (15b) und einen erhabenen Bereich (15c) aufweist, der gegabelt ist, um zwei gegenüberliegende Vor-

sprünge (15d) zu bilden, um dazwischen einer Schieber (S) zu erfassen.

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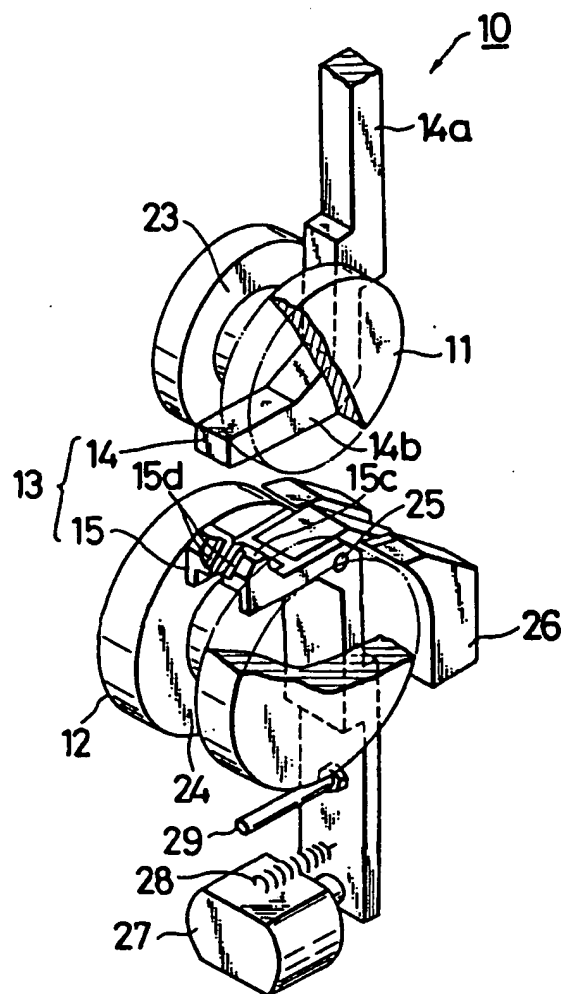
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FIG. 1





**FIG. 3**

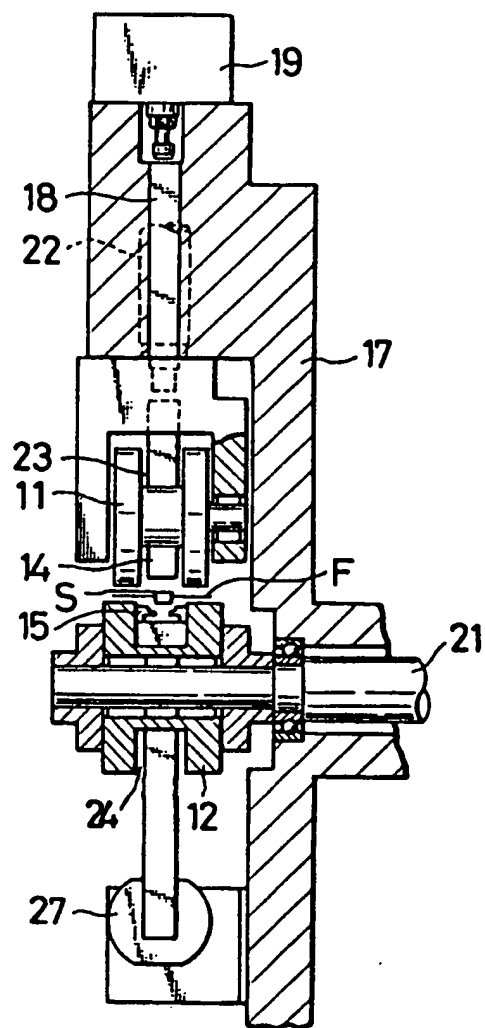
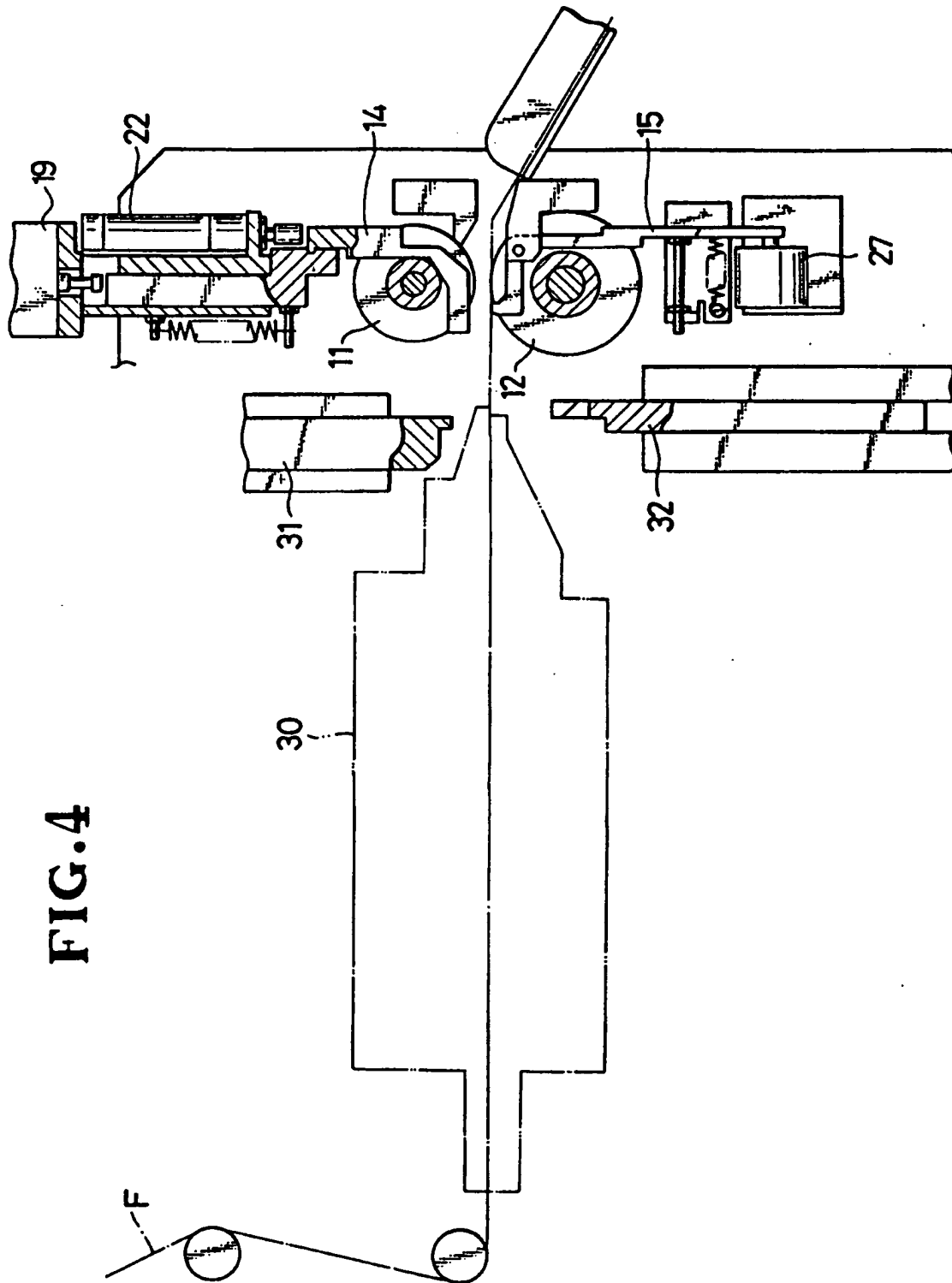
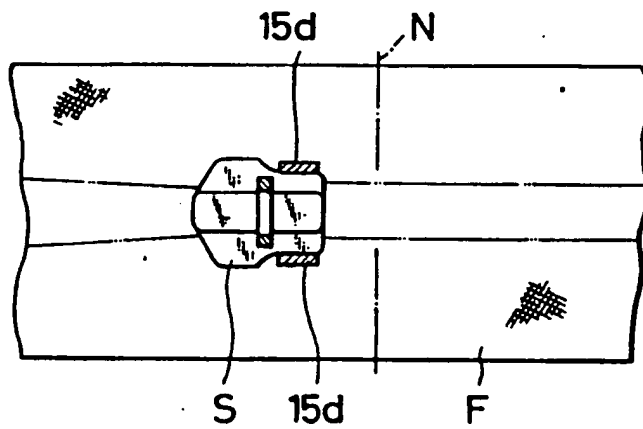




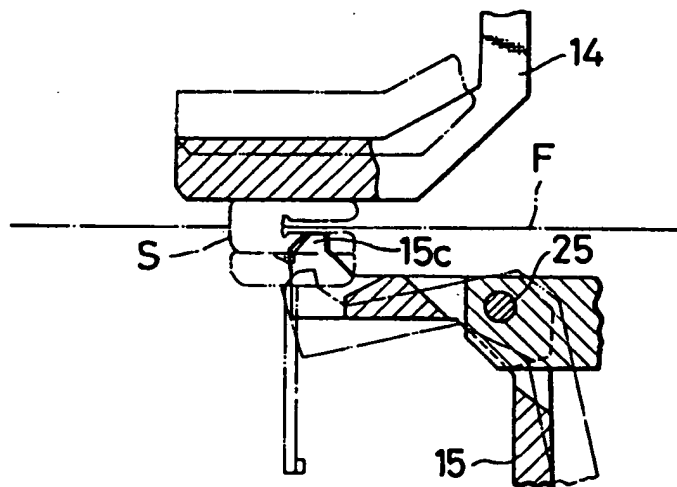
FIG. 4



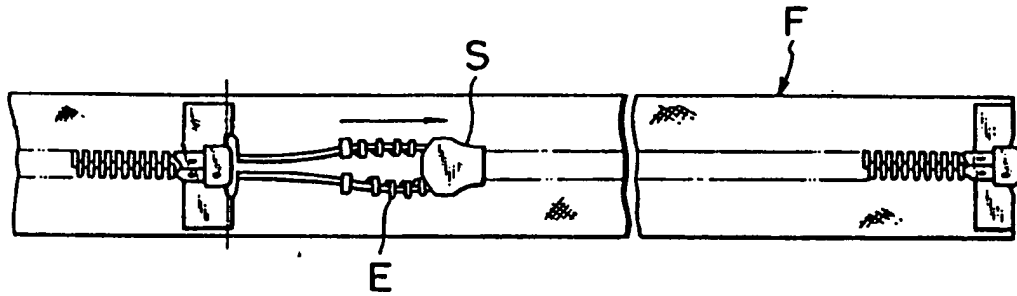
**FIG. 5**



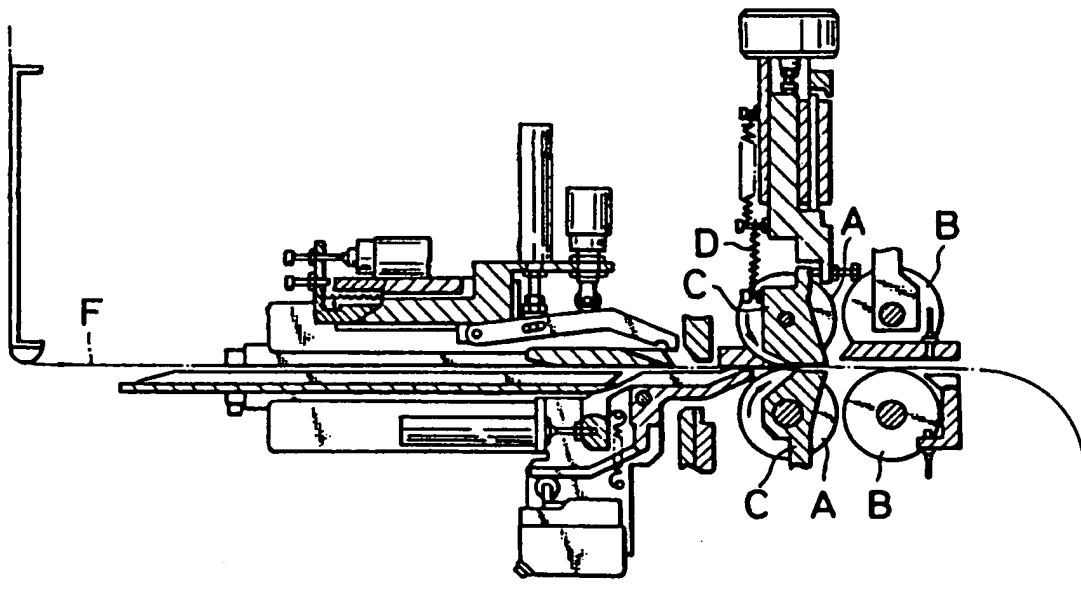
**FIG. 6**



**FIG. 7**



**FIG. 8**  
PRIOR ART



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# EUROPEAN PATENT APPLICATION

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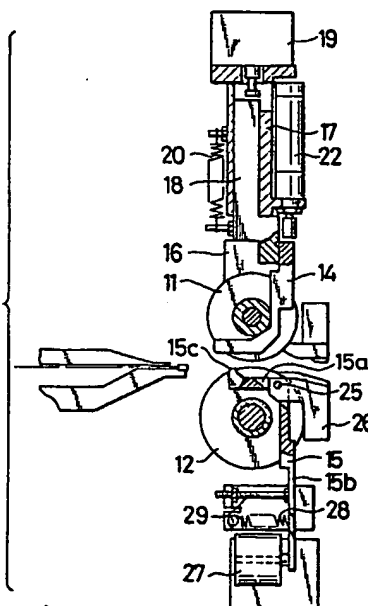
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54 **Slider handling apparatus.**

57 A slider handling apparatus (10) has a pressure roller (11) and a drive roller (12) peripherally engageable therewith to transfer a slide fastener chain (F) assembled with component parts including sliders (S). A slider arresting means (13) is operatively associated with the pressure and drive rollers (11), (12) for arresting sliders (S) one at a time on the fastener chain (F) at a predetermined point on the path of travel of the chain (F), the predetermined point being upstream of or in advance to the nip (N) of the two rollers (11), (12).

**FIG.2**



**EP 0 302 361 A1**

## SLIDER HANDLING APPARATUS

This invention relates to an apparatus for handling sliders on a slide fastener chain and more particularly to such as a slider handling apparatus which is designed to arrest sliders one at a time and release the slider upon arrival at a predetermined point on the fastener chain.

There are known numerous devices associated with a slide fastener assembling apparatus for holding a slider in place during movement of a fastener chain to couple opposed rows of fastener elements together prior to severing the chain to individual fastener lengths. One such device is disclosed in Japanese Laid-Open Patent Publication 59-103608 in which there are provided two pairs of transfer rolls, one pair of which designated at A in Figure 8 of the accompanying drawings is provided with tiltable plate members C for releasably holding sliders one at a time mounted on a slide fastener chain F, while the other pair of transfer rolls B is adapted to move the chain until the slider held by the plate members C is brought into abutting engagement with the end stop member on the fastener chain F. The transfer rolls B are driven with a force greater than the tension of springs D associated with the plate members C, so that the plate members C are urged to rotate in the direction of transfer of the chain F thereby permitting the threading of the slider through the plate members C during the forward movement of the chain F.

The above prior art apparatus has a drawback in that as it involves two separate pairs of transfer rolls, the apparatus comes so much complicated and further in that the slider is brought all way back to the terminal end of the coupling element rows and hence cannot be adjusted in position or posture at a desired intermediate point in advance of the end stop portion of the chain.

The present invention seeks to provide a slider handling apparatus which is simple in construction and reliable in operation and which is designed to arrest sliders one at a time and release the slider upon arrival at a predetermined point on a slide fastener chain.

According to the invention, there is provided a slider handling apparatus which comprises: a pressure roller having a peripheral groove and vertically movable toward and away from the path of travel of a slide fastener chain carrying sliders thereon; a drive roller having a peripheral groove and engageable with said pressure roller across the fastener chain; and a slider arresting means comprising a) an upper stopper received in the peripheral groove in said pressure roller and vertically movable therewith and b) a lower stopper received in the peripheral groove in said drive roller and pivot-

ally connected to a bracket member to move into and out of the path of the fastener chain; said upper and lower stopper cooperating in arresting sliders one at a time at a position in advance of the nip of said pressure and drive rollers.

The above and other objects and features of the invention will be better understood from the following description taken in conjunction with the accompanying drawings in which like reference numerals refer to like or corresponding parts throughout the several views.

Figure 1 is a perspective view of an essential part of the apparatus of the invention;

Figure 2 is a side elevational view of the same;

Figure 3 is a front elevational view of the same;

Figure 4 is a side elevational view, partly schematic, of a general apparatus layout associated with the apparatus of the invention, utilized to explain the flow of an assembled slide fastener chain;

Figure 5 is a bottom view of a portion of a slide fastener chain, indicating the position for arresting the slider;

Figure 6 is a schematic side elevational view illustrating the manner in which the slider is arrested and released;

Figure 7 is a plan view of a portion of an elongate slide fastener chain; and

Figure 8 is a side elevational view of a prior art apparatus.

Referring now to the accompanying drawings and Figure 1 in particular, there is shown a slider handling apparatus 10 which essentially comprises a pressure roller 11 and a drive roller 12 which are brought into peripheral engagement with each other by means hereafter described to feed or transfer a slide fastener chain F, and a slider arresting means 13 comprising an upper stopper 14 and a lower stopper 15 associated with the pressure roller 11 and the drive roller 12, respectively.

As shown in Figure 2, the pressure roller 11 is rotatably journaled in and connected to a roller holder 16 movably supported on a frame 17. The roller holder 16 is moved downwardly together with the pressure roller 11 by a sliding rod 18 connected to a jig cylinder 19 and moved upwardly back to its original position by the action of a tension spring 20. The pressure roller 11 is thus movable toward and away from the path of travel of the fastener chain F and engageable thereacross with the drive roller 12.

As shown in Figure 3, the drive roller 12 is axially connected to and driven by a horizontally

extending drive shaft 21 connected to a drive source not shown.

The upper stopper 14 of the slider arresting means 13 is generally L-shaped and has a vertical arm 14a engageable with an air cylinder 22 (Figure 2) and a horizontal arm 14b received in a peripheral groove 23 in the pressure roller 11 as shown in Figure 1. The upper stopper 14 is connected to the roller holder 16 and vertically movable together with the pressure roller 11.

However, when the jig cylinder 19 is operated to allow the pressure roller 11 to move upwardly apart from the drive roller 12 under the force of the tension spring 20 to release the slide fastener chain F for cutting individual product lengths therefrom, the air cylinder 22 is operated to extend its piston rod to limit the upward movement of the pressure roller 11 and the upper stopper 14 to such an extent that the upper stopper 14 is arranged to retain its operative position in which the slider S is held by and between the upper and lower stoppers 14, 15.

The lower stopper 15 of the slider arresting means 13 has its major portion received in a peripheral groove 24 in the drive roller 12 and includes a relatively short horizontal arm 15a and a relatively long vertical arm 15b. The lower stopper 15 is pivotally connected at the junction of the two arms 15a, 15b to a pin 25 secured to a bracket member 26 to move into and out of the path of the chain F. The horizontal arm 15a has a rise portion 15c which is bifurcated as shown in Figure 1 to provide a pair of confronting lugs 15d for gripping therebetween a slider body S as better shown in Figure 5. The vertical arm 15b is connected at its lower end to and actuated by a jig cylinder 27 to rotate the lower stopper 15 counter-clockwise so as to disengage the lugs 15d from the slider S and is also connected to a tension spring 28 which normally biases the lower stopper 15 clockwise. Designated at 29 is a limiter which is adapted to retain the lugs 15d in selected operative position and which is threaded to be able to adjust its operative length relative to the lower stopper 15.

In operation of the apparatus 10 of the foregoing construction, the upper and lower stoppers 14, 15 of the slider arresting means 13 are held initially in their respective positions indicated by solid line (Figure 6) until the slider S on an individual fastener length of a continuous elongate fastener chain F arrives at and is arrested by the slider arresting means. The slide fastener chain F is assembled with component parts including for example a reinforcing strip, a pin-and-box separator, a top end-stop and a slider all on each of individual fastener product lengths as shown in Figure 7. The fastener chain F is fed or transferred through a position control unit 30 and passed be-

tween and gripped by the pressure roller 11 and the drive roller 12 as illustrated in the general equipment layout of Figure 4. The feeding or forward movement of the fastener chain F continues until the slider S reaches the slider arresting means 13 when the parallel side flange portions of the slider S engage in between the confronting lugs 15d of the lower stopper 15 as better shown in Figure 5. While the slider S is thus arrested, the fastener chain F still continues to move between the rollers 11 and 12 so that the rows of fastener elements E become coupled together upon passage through the slider S which has been held stationary. As the fastener chain F arrives at a predetermined point on the path of its travel, the control unit 30 sends a signal to discontinue the travel of the chain F, when the pressure roller 11 ascends and releases the chain F from the drive roller 12.

In this instance, however, the upward movement of the pressure roller 11 and the upper stopper 14 is limited by the air cylinder 22 in such a manner that the upper stopper 14 remains in engagement with the slider S as previously described.

The chain F is then severed by coacting cutters 31, 32 located upstream of the slider handling apparatus 10, whereupon the pressure roller 11 descends and grips the chain F against the driven roller 12 to further move the chain F, in which instance the lower stopper 15 is rotated counter-clockwise by actuation of the cylinder 27 so that the lugs 15d are retracted apart from the slider S as shown by phantom lines in Figure 6. In this manner, the individual slide fastener which has been severed from the chain F is moved out of the apparatus 10 for inventory.

Since the slider S is arrested according to the invention at a position upstream or in advance of the nip N of the two rollers 11, 12; namely, in such a position where the chain F is freely movable, it is possible to arrest the slider S properly even when it is somewhat malaligned on the chain F.

The timing for actuation of the cylinder 27 can be adjusted so as to change the position of the slider S to be released from the arresting means 13 as desired.

## Claims

1. A slider handling apparatus (10) which comprises: a pressure roller (11) having a peripheral groove (23) and vertically movable toward and away from the path of travel of a slide fastener chain (F) carrying sliders (S) thereon; a drive roller (12) having a peripheral groove (24) and engageable with said pressure roller (11) across the fas-

tener chain (F); and a slider arresting means (13) comprising a) an upper stopper (14) received in the peripheral groove (23) in said pressure roller (11) and vertically movable with said pressure roller (11) and b) a lower stopper (15) received in the peripheral groove (24) in said drive roller (12) and pivotally connected to a bracket member (26) to move into and out of the path of the fastener chain (F); said upper and lower stoppers (14), (15) cooperating in arresting sliders (S) one at a time at a position in advance of the nip (N) of said pressure and drive rollers (11), (12).

2. A slider handling apparatus according to claim 1, further comprising a means (22) for limiting upward movement of said upper roller (11) and said upper stopper (14) such that said upper stopper (14) is retained in operative position when said pressure roller (11) is lifted.

3. A slider handling apparatus according to claim 1 wherein said lower stopper (15) has a horizontal arm (15a), and a vertical arm (15b), and a rise portion (15c) which is bifurcated to provide a pair of confronting lugs (15d) for gripping therebetween a slider (S).

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**FIG. 1**

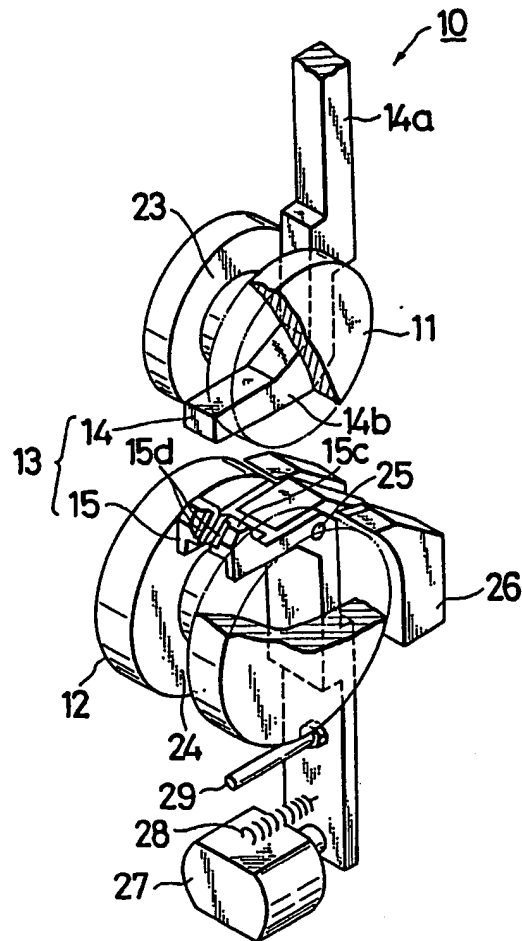




FIG. 2

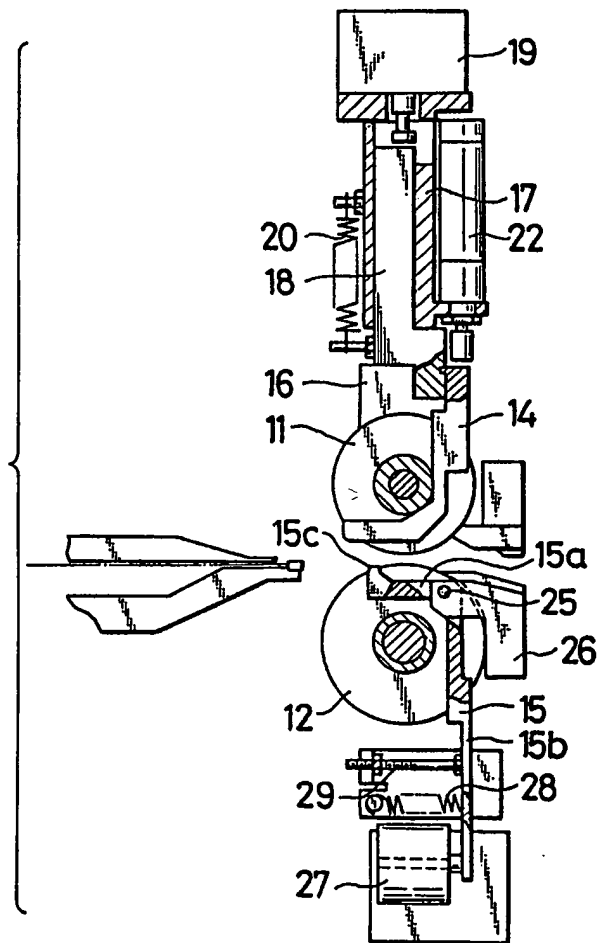


FIG. 3

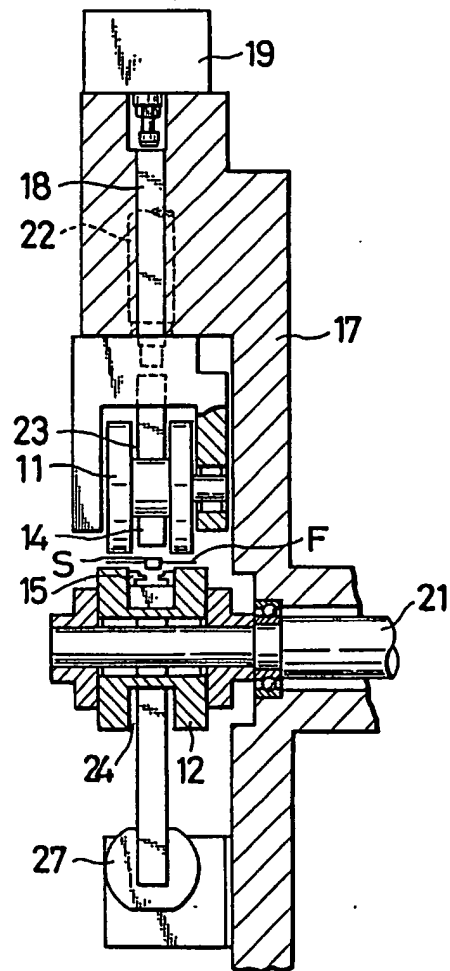
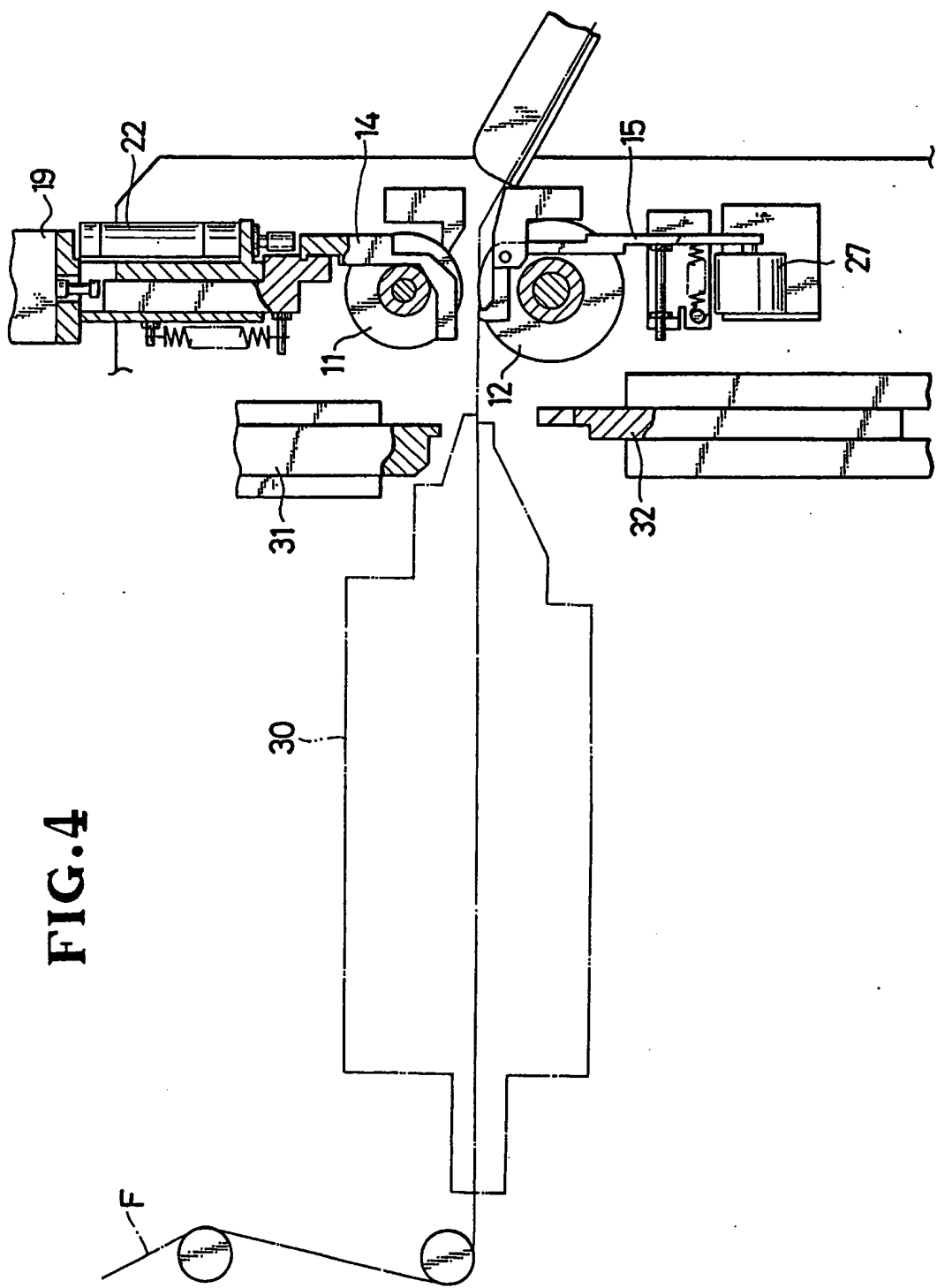
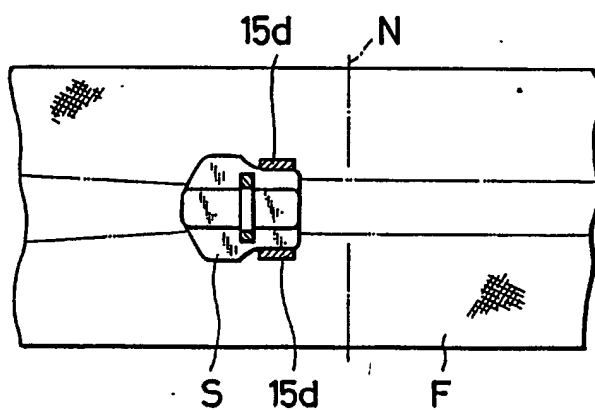


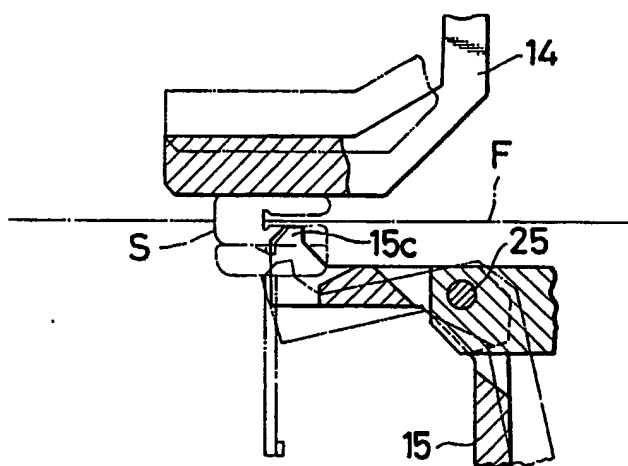
FIG. 4



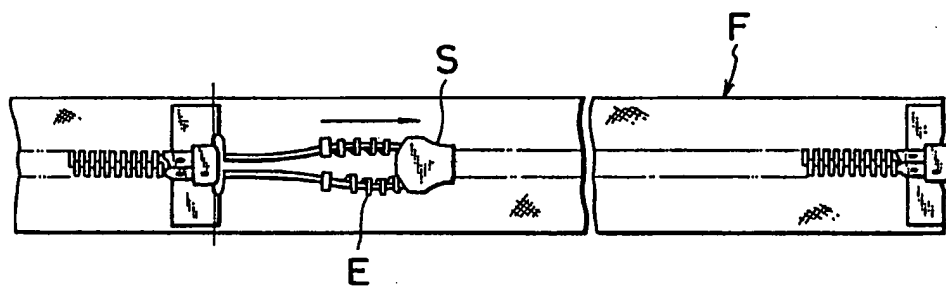
**FIG. 5**



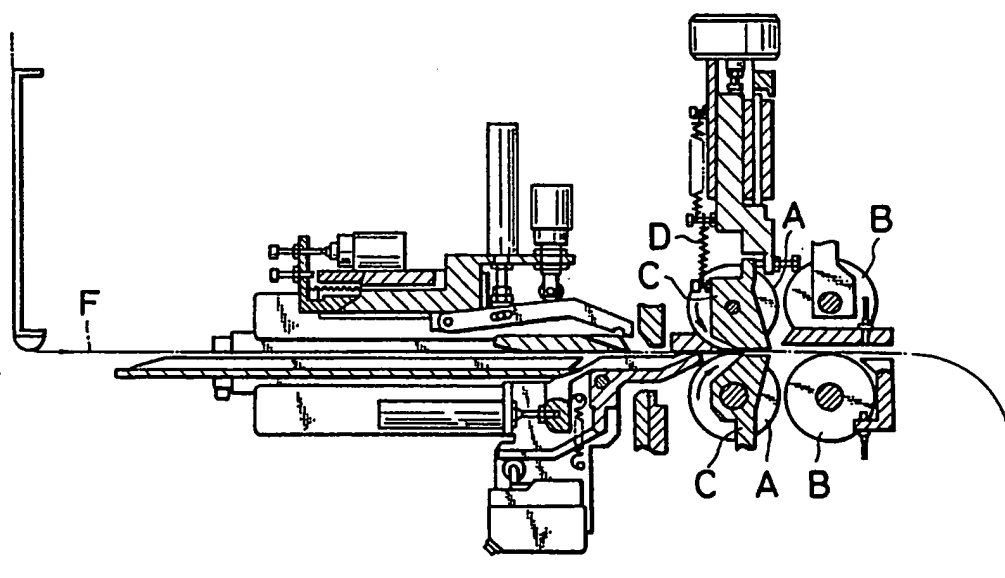
**FIG. 6**



**FIG. 7**



**FIG. 8**  
PRIOR ART





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 88 11 2022

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	EP-A-0 109 643 (YOSHIDA) * Page 6, line 24 - page 7, line 12; page 8, lines 14-21; page 9, line 23 - page 10, line 13; page 15, line 7 - page 19, line 15; page 23, line 25 - page 26, line 9; page 27, line 24 - page 29, line 1; figures 1,2,6,12 * & JP-A-59 103 608 (Cat. D) ---	1-3	A 44 B 19/42
A	EP-A-0 193 954 (YOSHIDA) * Page 13, line 19 - page 15, line 13; claims 5,6,8,15-18; figure 7 * ---	1-3	
A	EP-A-0 083 113 (YOSHIDA) * Page 4, lines 14-24; page 5, lines 9-31; page 6, lines 7-32; page 9, line 22 - page 11, line 2; figures 1,2 * ---	1	
A	JP-B-54 041 940 ---		
P,A	EP-A-0 242 213 (YOSHIDA) * Column 2, line 20 - column 5, line 48; figures 1-3 * -----	1-3	TECHNICAL FIELDS SEARCHED (Int. Cl.4)  A 44 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 07-11-1988	Examiner BOURSEAU A.M.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document  T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons  & : member of the same patent family, corresponding document			